Appl. No. 09/655,755
Amdi. Dated September 19, 2005
Reply to Office action of May 24, 2005
Attorney Docket No. P12103-US1
EUS/J/P/05-1234

Amendments to the Claims:

This listing of claims replaces all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Previously Presented) A method of designing a digital filter, including the steps of:

first, determining a real-valued discrete-frequency representation of a desired full length digital filter;

second, transforming said real-valued discrete-frequency representation into a corresponding discrete-time representation;

third, circularly shifting said discrete-time representation; and

fourth, applying a shortening window to said discrete-time representation to produce a zero-padded reduced length filter.

- 2. (Previously Presented) The method of claim 1, further including the step of circularly shifting said zero-padded reduced length filter to remove leading zeroes.
- 3. (Previously Presented) The method of claim 1, wherein said real-valued discrete-frequency representation is formed by a noise suppressing spectral subtraction algorithm.
- 4. (Previously Presented) The method of claim 1, wherein said real-valued discrete-frequency representation is formed by a frequency selective non-linear algorithm for echo cancellation.
- 5. (Previously Presented) The method of claim 1, wherein said shortening window is a Kaiser window.

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- 6. (Previously Presented) The method of claim 1, further including the step of transforming said zero-padded reduced length filter into a minimum phase filter.
- 7. (Previously Presented) A digital convolution method, including the steps of:

first, determining a real-valued discrete-frequency representation of a desired full length digital filter;

second, transforming said real-valued discrete-frequency representation into a corresponding discrete-time representation;

third, circularly shifting said discrete-time representation;

fourth, applying a shortening window to said discrete-time representation to produce a zero-padded reduced length filter; and

fifth, convolving an input signal with said zero-padded reduced length filter.

- 8. (Previously Presented) The method of claim 7, further including the step of circularly shifting said zero-padded reduced length filter to remove leading zeroes.
- 9. (Previously Presented) The method of claims 7, further including the step of transforming said zero-padded reduced length filter into a minimum phase filter.
- 10. (Previously Presented) The method of claim 7, wherein the step of convolving includes the step of performing a convolution in the time domain using the discrete-time representation of said zero-padded reduced length filter.
- 11. (Previously Presented) The method of claim 7, wherein the step of convolving includes the step of performing a convolution in the frequency domain by using an overlap-add method.

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- 12. (Previously Presented) The method of claim 7, wherein the step of convolving includes the step of performing a convolution in the frequency domain by using an overlap-save method.
- 13. (Previously Presented) A digital filter design apparatus, including: means for determining a real-valued discrete-frequency representation of a desired full length digital filter;

means, coupled to the output of said means for determining a real-valued discrete-frequency representation, for transforming said real-valued discrete-frequency representation into a corresponding discrete-time representation;

means, coupled to the output of said means for transforming said real-valued discrete-frequency representation, for circularly shifting said discrete-time representation; and

means, coupled to the output of said means for circularly shifting said discretetime representation, for applying a shortening window to said discrete-time representation to produce a zero-padded reduced length filter.

- 14. (Previously Presented) The apparatus of claim 13, further including means for circularly shifting said zero-padded reduced length filter to remove leading zeroes.
- 15. (Previously Presented) The apparatus of claim 13, wherein the shortening window applying means implements a Kaiser window.
- 16. (Previously Presented) The apparatus of claim 13, further including means for transforming said zero-padded reduced length filter into a minimum phase filter.
 - 17. (Previously Presented) A digital convolution apparatus, including:

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means for determining a real-valued discrete-frequency representation of a desired full length digital filter;

means, coupled to the output of said means for determining a real-valued discrete-frequency representation, for transforming said real-valued discrete-frequency representation into a corresponding discrete-time representation;

means, coupled to the output of said means for transforming said real-valued discrete-frequency representation, for circularly shifting said discrete-time representation;

means, coupled to the output of said means for circularly shifting said discretetime representation, for applying a shortening window to said discrete-time representation to produce a zero-padded reduced length filter; and

means, coupled to the output of said means for applying a shortening window to said discrete-time representation, for convolving an input signal with said zero-padded reduced length filter.

- 18. (Previously Presented) The apparatus of claim 17, further including means for circularly shifting said zero-padded reduced length filter to remove leading zeroes.
- 19. (Previously Presented) The apparatus of claims 17, further including means for transforming said zero-padded reduced length filter into a minimum phase filter.
- 20. (Previously Presented) The apparatus of claim 17, further including means for performing the convolution in the time domain using the discrete-time representation of said zero-padded reduced length filter.
- 21. (Previously Presented) The apparatus of claim 17, wherein said means for convolving comprises means for performing a convolution of said input signal in the frequency domain by using an overlap-add method.

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22. (Previously Presented) The method of claim 17, wherein said means for convolving comprises means for performing a convolution of said input signal in the frequency domain by using an overlap-save method.

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